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PART I

DEFENSE NUCLEAR AGENCY EFFECTS MANUAL NUMBER 1

CAPABILITIES OF NUCLEAR WEAPONS

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1 JULY 1972

HEADQUARTERS
Defense Nuclear Agency
Washington, D.C. 20305

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CHANGE 1
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PART I PHENOMENOLOGY

HEADQUARTERS
Defense Nuclear Agency
Washington, D.C. 20305

EDITOR
PHILIP J. DOLAN
SRI INTERNATIONAL

LIST OF EFFECTIVE PAGES

The following is a list of current pages for Part I, *Phenomenology*, of DNA Effects Manual Number 1 (DNA EM-1), *Capabilities of Nuclear Weapons*. When applicable, insert latest change pages; dispose of superceded pages in accordance with applicable regulations.

Total number of pages in this part of the Handbook is , consisting of the following:

i through ii ..... change 1
iii through xlii ..... original
xliii through xliv ..... change 1
xlv through xlviii ..... original
1-1 through 1-30 ..... original
2-1 through 2-276 ..... original
3-1 through 3-114 ..... original
4-1 through 4-50 ..... original
5-1 through 5-144 ..... original
5-145 through 5-152 ..... change 1
6-1 through 6-4 ..... original
6-5 through 6-8 ..... change 1
6-9 through 6-16 ..... original
7-1 through 7-40 ..... change 1
8-1 through 8-94 ..... original

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ix through xxii	original
xxiii through xxv	change 2
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xli through xlii	change 2
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6-9 through 6-16	original
7-1 through 7-40	change 1
8-1 through 8-94	original

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DEFENSE NUCLEAR AGENCY
WASHINGTON, D.C. 20305

1 July 1972

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CAPABILITIES OF NUCLEAR WEAPONS [redacted]

The Revised Edition January 1968, *Capabilities of Nuclear Weapons* [redacted], DASA EM-1 is hereby superseded and cancelled.

With the concurrence of the Military Services, this document was redesignated DASA Effects Manual Number 1 (DASA EM-1) by action of the Joint Chiefs of Staff on 8 July 1966. With the change of the Defense Atomic Support Agency to the Defense Nuclear Agency on 1 July 1971, this document was redesignated the DNA Effects Manual Number 1 (DNA EM-1). Publication and initial distribution of future changes and revisions of this document will be effected by the Defense Nuclear Agency.

FOR THE DIRECTOR:

John A. Northrop

JOHN A. NORTHROP
Deputy Director (Science & Technology)

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FOREWORD

This edition of the *Capabilities of Nuclear Weapons* represents the continuing efforts by the Defense Nuclear Agency to correlate and make available nuclear weapons effects information obtained from nuclear weapons testing, small-scale experiments, laboratory effort and theoretical analysis. This document presents the phenomena and effects of a nuclear detonation and relates weapons effects manifestations in terms of damage to targets of military interest. It provides the source material and references needed for the preparation of operational and employment manuals by the Military Services.

The *Capabilities of Nuclear Weapons* is not intended to be used as an employment or design manual by itself, since more complete descriptions of phenomenological details should be obtained from the noted references. Every effort has been made to include the most current reliable data available on 31 December 1971 in order to assist the Armed Forces in meeting their particular requirements for operational and target analysis purposes.

Comments concerning this manual are invited and should be addressed:

Director
Defense Nuclear Agency
ATTN: STAP
Washington, D. C. 20305

C. H. DUNN
Lt General, USA
Director

[redacted]

[redacted]

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14. KEY WORDS	LINK A		LINK B		LINK C	
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Cratering Phenomena						
Ground Shock Phenomena						
Water Shock Phenomena						
Underwater Cratering Phenomena						
Water Surface Phenomena						
Thermal Radiation Phenomena						
X-Ray Radiation Phenomena						
Nuclear Radiation Phenomena						
Initial Nuclear Radiation						
Neutron Induced Activity						
Residual Radiation						
Transient Radiation Effects on Electronics Phenomena						
TREE Phenomena						
Electromagnetic Pulse Phenomena						
EMP Phenomena						
Phenomena Affecting Electromagnetic Wave Propagation						
Blast and Shock Damage						
Thermal Radiation Damage						
X-Ray Damage						
Nuclear Radiation Shielding						
TREE Damage Mechanisms						
EMP Damage						
Personnel Casualties						
Blast Injury						
Thermal Injury						
Nuclear Radiation Injury						
Combined Injury						
Damage to Structures						
Shock Vulnerability of Equipment and Personnel						
Damage to Field Fortifications						
Damage to Dam and Harbor Installations						
Damage to POL Tanks						
Fire in Urban Areas						
Damage to Naval Equipment						
Damage to Surface Ships						
Damage to Subsurface Ships						
Damage to Aircraft						
Damage to Military Field Equipment						
Air Blast Damage to Military Field Equipment						
Thermal Damage to Military Field Equipment						
TREE Damage to Military Field Equipment						
Forest Stand Damage						
Air Blast in Forest Stands						
Blowdown						
Thermal Damage in Forests						
Forest Blowdown Effects on Mobility						
Damage to Missiles						
Radio Frequency Signal Degradation Relevant to Communications Systems						
Radio Frequency Signal Degradation Relevant to Radar Systems						

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[redacted] This edition of the "Capabilities of Nuclear Weapons" represents the continuing efforts by the Defense Nuclear Agency to correlate and make available nuclear weapons effects information obtained from nuclear weapons testing, small-scale experiments, laboratory effort and theoretical analysis. This document presents the phenomena and effects of a nuclear detonation and relates weapons effects manifestations in terms of damage to targets of military interest. It provides the source material and references needed for the preparation of operational and employment manuals by the Military Services.

[redacted] The "Capabilities of Nuclear Weapons" is not intended to be used as an employment [redacted] by itself, since more complete descriptions of phenomenological [redacted] could be obtained from the noted references. Every effort has been made [redacted] most current reliable data available on 31 December 1971 in order [redacted] Armed Forces in meeting their particular requirements for operati[redacted] target analysis purposes.

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